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Product Specification

XBLW AOD413A

P-Channel Enhancement Mode MOSFET
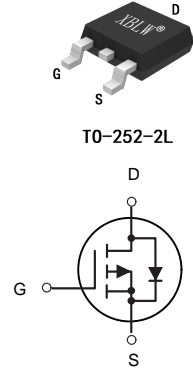
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RoHS

Description

The AOD413A uses advanced trench technology to provide excellent RDS(ON), low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

- VDS = -40V ID =-25A
- RDS(ON) < 44 mΩ@VGS=10V

Application

- Battery protection
- Load switch
- Uninterruptible power supply

TO−252−2L

P-Channel MOSFET

Package Marking and Ordering Information

Product Model	Package Type	Marking	Packing	Packing Qty
XBLW AOD413A	TO-252-2L	AOD413A	Tape	2500Pcs/Reel

Absolute Maximum Ratings (TC=25°Cunless otherwise noted)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	-40	V
VGS	Gate-Source Voltage	±25	V
I_D@T_C=25°C	Continuous Drain Current, V_{GS} @ 10V[1]	-25	A
I_D@T_C=100°C	Continuous Drain Current, V_{GS} @ 10V[1]	-12	A
IDM	Pulsed Drain Current[2]	-40	A
P_D@T_C=25°C	Total Power Dissipation[4]	8	W
TSTG	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C
$R_\theta JA$	Thermal Resistance Junction-ambient [1]	62	°C/W
$R_\theta JC$	Thermal Resistance Junction-Case[1]	18.8	°C/W

Electrical Characteristics (TJ=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-40V$, $V_{GS}=0V$	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	$V_{DS}=0V$, $V_{GS}=\pm 20V$	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu A$	-1.0	-1.6	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note3	$V_{GS}=-10V$, $I_D=-8A$	-	31	44	mΩ
		$V_{GS}=-4.5V$, $I_D=-5A$	-	44	60	
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-20V$, $V_{GS}=0V$, f=1.0MHz	-	1034	-	pF
C_{oss}	Output Capacitance		-	107	-	pF
C_{rss}	Reverse Transfer Capacitance		-	79.5	-	pF
Q_g	Total Gate Charge	$V_{DS}=-20V$, $I_D=-5A$, $V_{GS}=-10V$	-	20	-	nC
Q_{gs}	Gate-Source Charge		-	3.5	-	nC
Q_{gd}	Gate-Drain("Miller") Charge		-	4.2	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-20V$, $I_D=-5A$, $V_{GS}=-10V$, $R_{GEN}=2.5\Omega$	-	8	-	ns
t_r	Turn-on Rise Time		-	15	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	23	-	ns
t_f	Turn-off Fall Time		-	9	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-23	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-40	A
V_{SD}	Drain to Source Diode Forward Voltage	$V_{GS}=0V$, $I_S=-10A$	-	-0.8	-1.2	V
trr	Reverse Recovery Time	VGS =0V, IS=-5A, di/dt=100A/μs	-	29	-	ns
Qrr	Reverse Recovery Charge		-	20	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J=25°C$, $V_{DD}=-20V$, $V_G=-10V$, L=0.5mH, $R_G=25\Omega$, $I_{AS}=-10.5A$

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

Typical Performance Characteristics
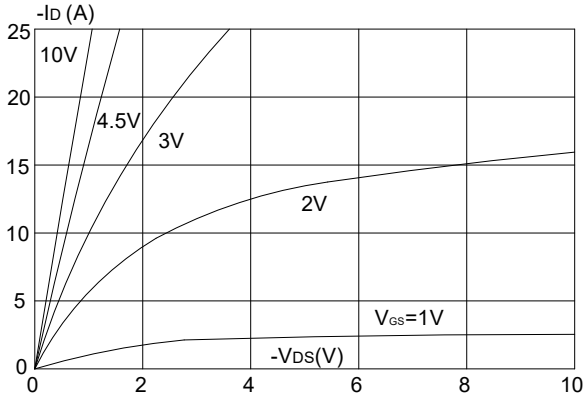
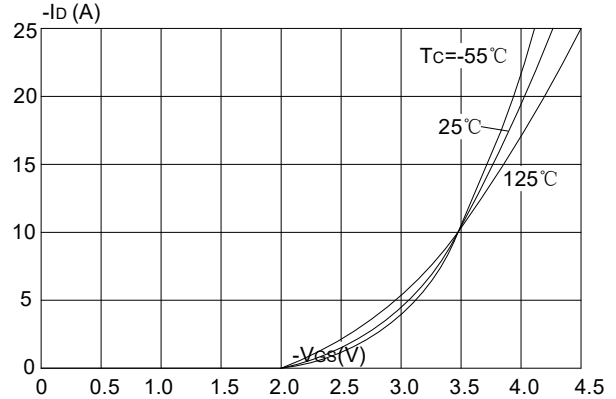**Figure1:** Output Characteristics

Figure 2: Typical Transfer Characteristics

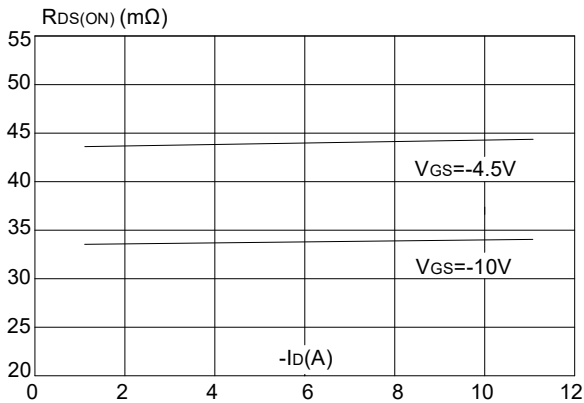**Figure 3:** On-resistance vs. Drain Current

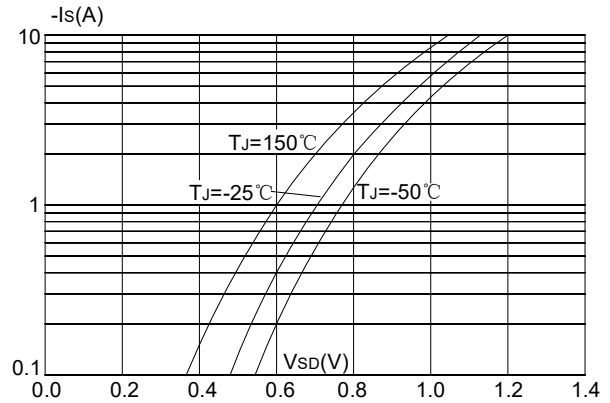**Figure 4:** Body Diode Characteristics

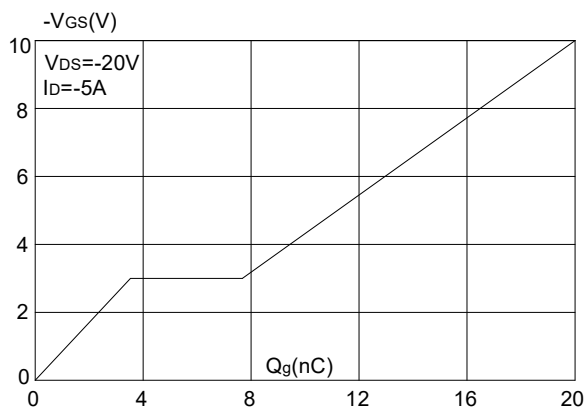**Figure 5:** Gate Charge Characteristics
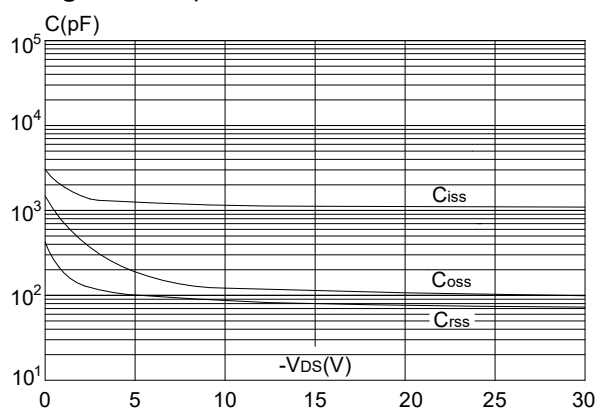

Figure 6: Capacitance Characteristics

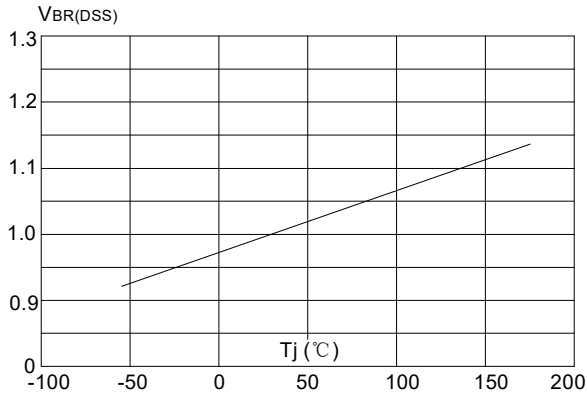**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature

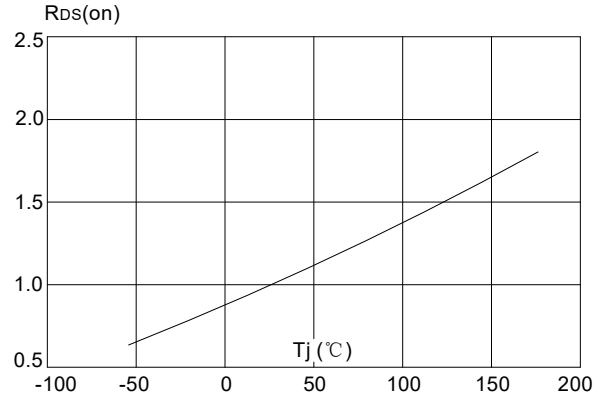**Figure 8:** Normalized on Resistance vs. Junction Temperature

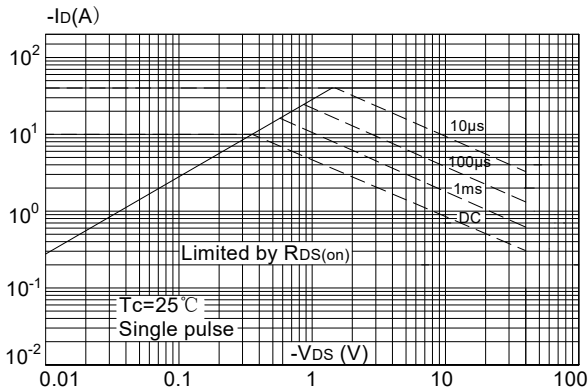**Figure 9:** Maximum Safe Operating Area

Figure 10: Maximum Continuous Drain Current vs. Case Temperature
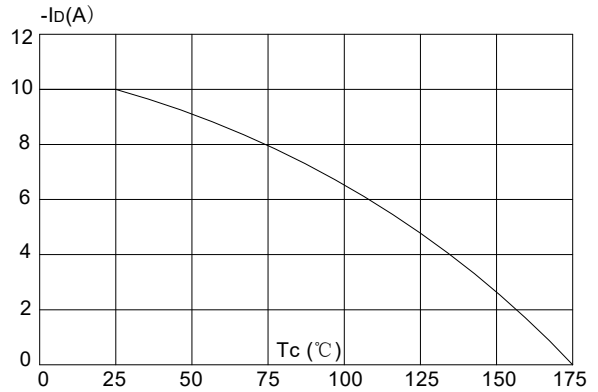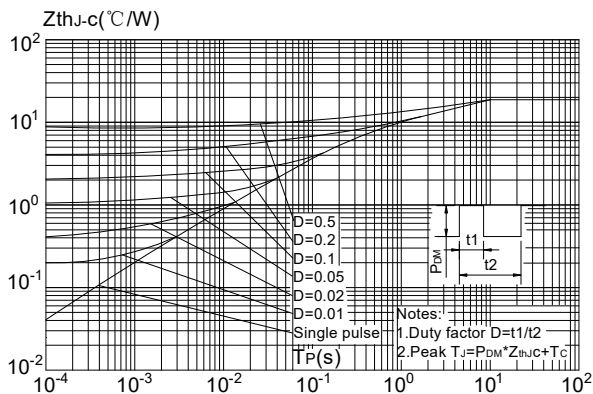

Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case
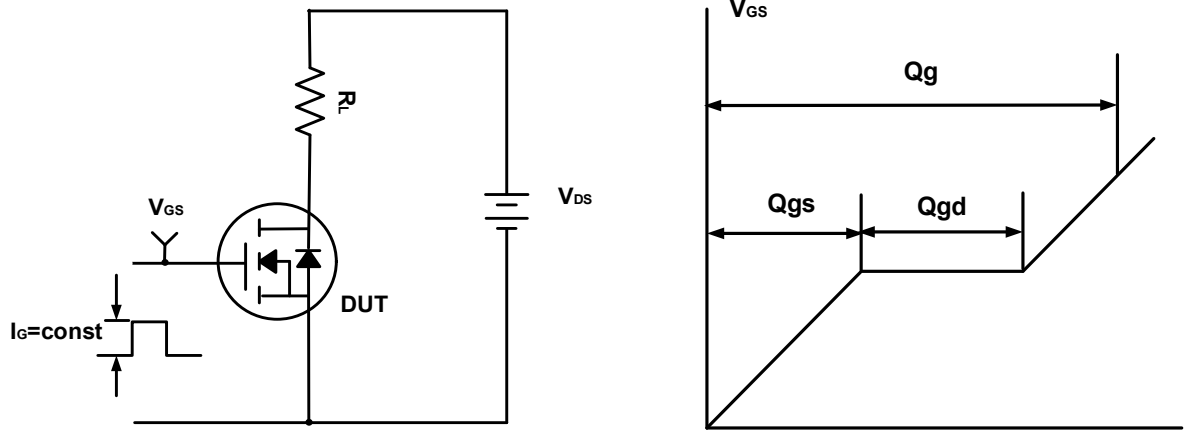
Test Circuit

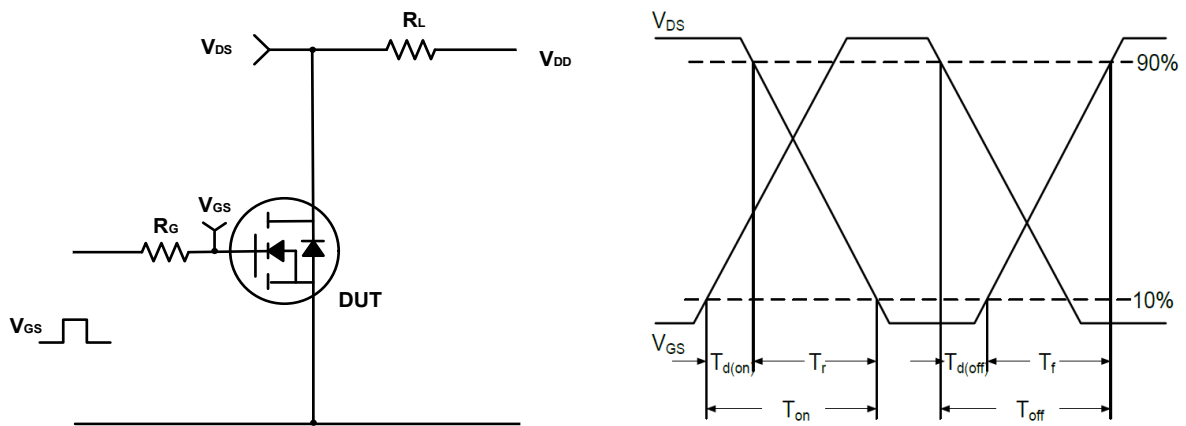**Figure A. Gate Charge Test Circuit & Waveforms**
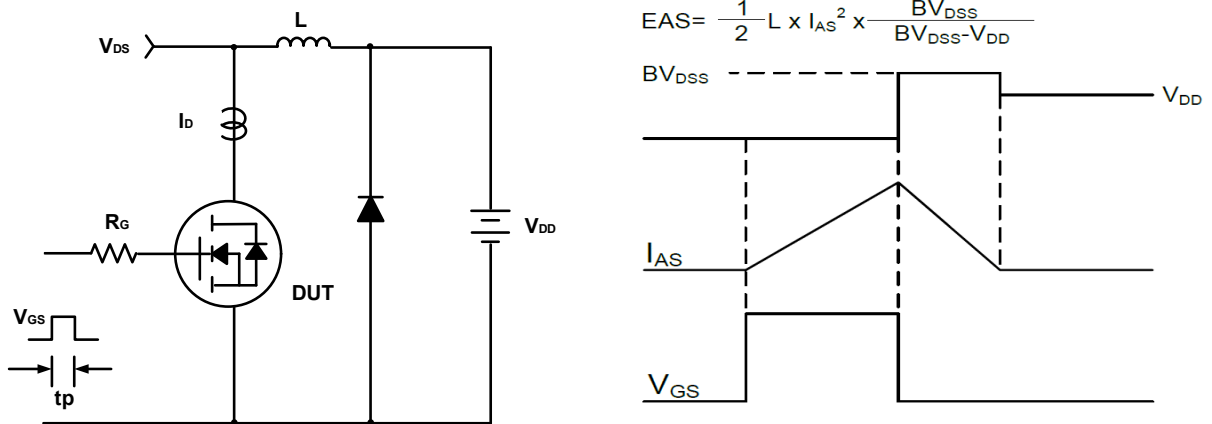

Figure B. Switching Test Circuit & Waveforms

$$EAS = \frac{1}{2} L \times I_{AS}^2 \times \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$
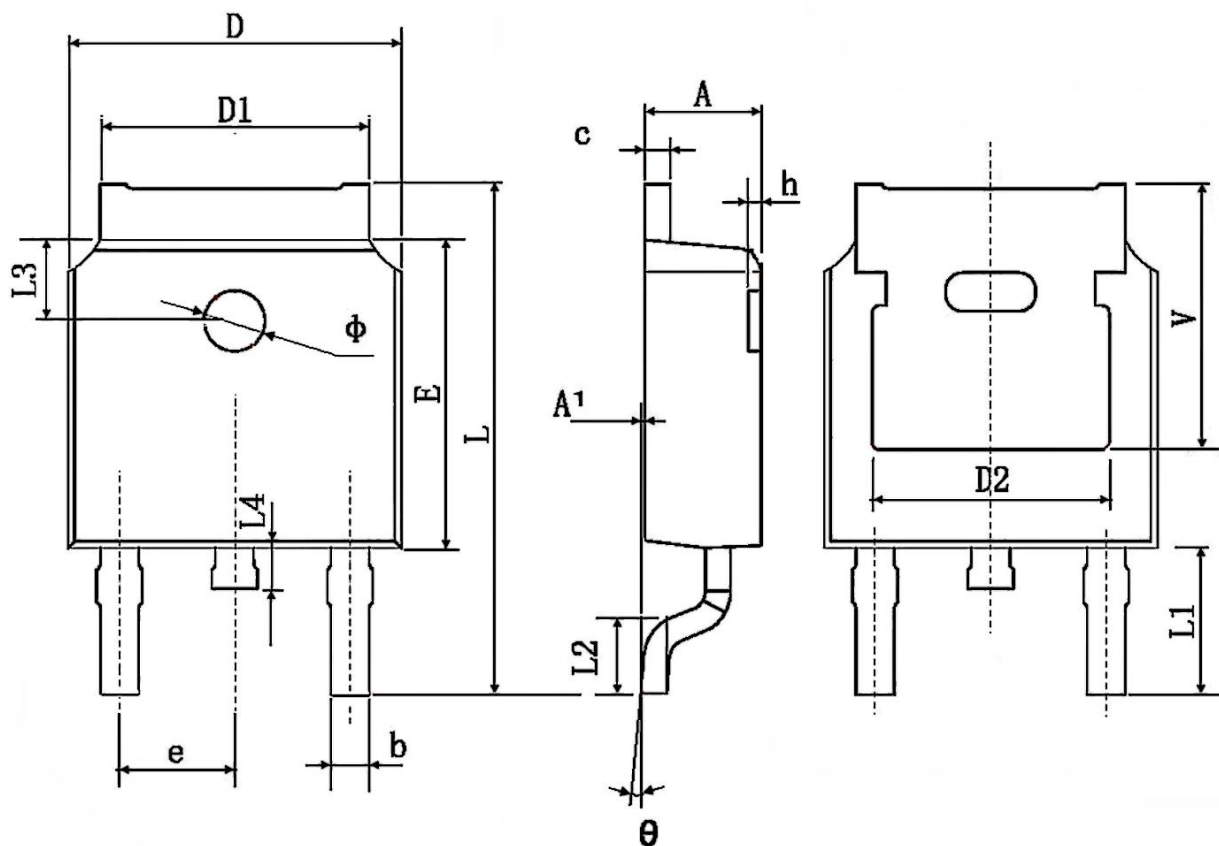
Figure C. Unclamped Inductive Switching Circuit & Waveforms

Package Information

TO252-2L

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0。	8。	0。	8。
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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